

SCIENTIFIC BRIEF

Studies Using MX3

List of publications completed independently or in collaboration with MX3 Diagnostics, incorporating the use of MX3 products.

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01

INDEPENDENT STUDIES

2026

[Winkler, A.M., Zaplatosch, M.E., Smith, C.J., Adams, W.M., Willis, C.F., Bovine, S., McClure, M.R., Santos, G., Chmunevich, Y., Mitchell, S.J. and O'Grady, E., Validation of the portable MX3 Hydration Testing System for Measuring Saliva Osmolality. *Frontiers in Nutrition*, 13, p.1882490.](#)

[Winter, I.P. and Wilson, P.B., 2026. Does Skeletal Muscle Mass Predict Urine and Saliva Measures of Hydration Status? A Cross-Sectional Analysis. *Journal of the American Nutrition Association*, pp.1-6.](#)

[Herrera-Amante, C.A., Ríos-Limas, I., Carvajal-Veitía, W., Yáñez-Sepúlveda, R., Morón-López, C.D., Mendoza-Sánchez, K.J., Figueroa-Conde, J.A., Ramos-García, C.O. and López-Gil, J.F., 2026. Body fat estimation in the Mexican women's national soccer team: a cross-sectional agreement study between a derived Mexican Football Federation anthropometric equation and dual-energy X-ray absorptiometry. *Journal of the International Society of Sports Nutrition*, 23\(1\), p.2690002.](#)

[Esh, C.J., Carter, S., Bougault, V., Girard, O., van Rensburg, D.C.J., Christmas, B.C., Meyer, T. and Taylor, L., 2026. One Step Further: Integrating Evidence-Based Guidelines into Practice to Address Environmental Challenges at the Men's 2026 FIFA World Cup: CJ Esh et al. *Sports Medicine*, pp.1-18.](#)

[McDonald, P., John, K., Topham, T.H., Sawka, M.N., Clark, B. and Périard, J.D., 2026. Dry and humid heat acclimation induces similar adaptations and cross-acclimation benefits in trained male cyclists. *The Journal of Physiology*.](#)

[Winter, I.P., Burdin, J. and Wilson, P.B., 2026. Associations Between Skeletal Muscle Mass, Fat-Free Mass, and Saliva Osmolality: A Cross-Sectional Study. *Clinical Journal of Sport Medicine*, 36\(4\), pp.508-513.](#)

[Akgün, S., Akdemir, E., Anıl, B., Salkılıç, E.K., Kumru, D., Mor, A., Kargın, Z., Kanık, G., Ermiş, A., Samet, H.A. and Ali, K.Y., 2026. Effects of collagen supplementation on the physical, functional, and metabolic parameters in male soccer players: a randomized, double-blind, placebo-controlled study. *Journal of Men's Health*, 22\(2\).](#)

2025

[Holland-Winkler, A. Maleah, et al. "Hydration Tracking via Saliva Osmolarity in Recruit Firefighters Throughout a 12-Week Fire School." *Fire* 8.2 \(2025\): 39.](#)

[KARGIN, Z., ABDİOĞLU, M., MOR, H., ARSLANOĞLU, E., OKUR, S. and MOR, A., 2025. The effects of pre-exercise co-ingestion of caffeinated gum and carbohydrate gel on functional threshold power and physiological-perceptual responses in youth road cyclists. *Journal of Physical Education & Sport*, \(12\).](#)

[Schwarz, E., Oliveira, C.B., Muñoz, M.D., Alanis, A., Alanis, M., Lara, A., Freeze, A., Costa, J.A., Eckerle, L., Meyer, T. and Duffield, R., 2025. Core Temperature Responses of Male Footballers during Matches in the Heat–Associations with Physiological and Running Demands. *Journal of Science and Medicine in Sport*.](#)

[Schwarz, E., Oliveira, C.B., Duarte Muñoz, M., Alanis, A., Alanis, M., Lara, A., Freeze, A., Costa, J.A., Meyer, T. and Duffield, R., 2025. Effects of Pre-cooling and Cooling Breaks on Thermoregulatory, Physiological and Match Running Responses During Football in Moderate and Hot Temperatures. *Sports Medicine*, pp.1-15.](#)

2024

[Winter, Ian, Josie Burdin, and Patrick B. Wilson. "Reliability and minimal detectable change of the MX3 hydration testing system." *PloS one* 19.11 \(2024\): e0313320.](#)

[Schuerger, Carly, et al. "Fluid Intake and Hydration Responses to Mass Participation Gravel Cycling." *International Journal of Exercise Science* 17.2 \(2024\): 1648-1662.](#)

[Mor, Ahmet, et al. "Moderate-dose caffeine enhances anaerobic performance without altering hydration status." *Frontiers in Nutrition* 11 \(2024\): 1359999.](#)

[Mor, Ahmet, et al. "The Combined Effect of Glutamine and Creatine Supplementation on Body Hydration Level and Some Performance Parameters in Football Players." *Herkes için Spor ve Rekreasyon Dergisi* 6.2 \(2024\): 169-179.](#)

[Kim, Ka Ram, et al. "All-in-One, Wireless, Multi-Sensor Integrated Athlete Health Monitor for Real-Time Continuous Detection of Dehydration and Physiological Stress." *Advanced Science* \(2024\): 2403238.](#)

[Brown, Harry A., Brad Clark, and Julien D. Périard. "Reliability and validity of the MX3 portable sweat sodium analyser during exercise in warm conditions." *European Journal of Applied Physiology* \(2024\): 1-8.](#)

[Brown, Harry A., et al. "Thermal and cardiovascular heat adaptations in active adolescents following summer." *Temperature* \(2024\): 1-12.](#)

[Bertuccioli A, Cannataro R, Sisti D, Zonzini GB, Cazzaniga M, Cardinali M, Di Pierro F, Gregoret A, Zerbini N, Matera M, et al. Assessment of Perceived Effort Through On-Field Hydration Monitoring: A Case Analysis. *Life*. 2024; 14\(11\):1447. <https://doi.org/10.3390/life14111447>](#)

2023

[Shitanda, Isao, et al. "Wearable ion sensors for the detection of sweat ions fabricated by heat-transfer printing." *ACS sensors* 8.7 \(2023\): 2889-2895.](#)

[KIZILKAN, Samet, and Ahmet MOR. "Elit Güreşçilerde Akut Sıvı Kaybının Bazı Fiziksel, Fizyolojik ve Performans Parametrelerine Etkisi." *Sportif Bakış: Spor ve Eğitim Bilimleri Dergisi* 10.3 \(2023\).](#)

[Brown, Harry A., et al. "Evidence of seasonal heat acclimatisation in recreationally active adults during a mild summer." *Journal of Science and Medicine in Sport* 26.12 \(2023\): 700-706.](#)

2022

[Akyüz, Ömer, et al. "Elit futbolcuların maç öncesi dehidrasyon düzeylerinin incelenmesi." *Akdeniz Spor Bilimleri Dergisi* 5.Özel Sayı 1 \(2022\): 474-482.](#)

02

STUDIES PERFORMED WITH MX3 COLLABORATION

2025

[Kaul N, Duan J, Cui D, Erlichster M, Chen Z, Anderson D, et al. Serial correlation between saliva and blood beta-hydroxybutyrate levels in children commencing the ketogenic diet for epilepsy. *Epilepsia*. 2025;00:1–11. <https://doi.org/10.1111/epi.18465>](https://doi.org/10.1111/epi.18465)

2022

[Atjo, Neng Mira, et al. "Point-of-Care Saliva Osmolarity Testing for the Screening of Hydration in Older Adults With Hypertension." *Journal of the American Medical Directors Association* 23.12 \(2022\): 1984-e9.](#)

2021

[Faidah, Nur, et al. "Detection of voluntary dehydration in paediatric populations using non-invasive point-of-care saliva and urine testing." *Journal of Paediatrics and Child Health* 57.6 \(2021\): 813-818.](#)